Restoration of OHV-damaged Areas - A Ten-Step Checklist

prepared for

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by

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1 Introduction

During field visits to Ranger Districts between April 6 and August 30, 2005, observations were made at 87 OHV restoration sites. Many of these projects were successful, but quite a few were either unsuccessful or only partially successful. It became apparent that the success or failure of OHV restoration projects was related to following a process consisting of a set of steps. In discussions with OHV managers, the idea of a checklist that could be followed when doing OHV restoration evolved.

This report presents that checklist as a set of steps to consider when planning and implementing an OHV restoration project. This is followed by a discussion of each step and why it is important.

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2 The Restoration Process

The goals of OHV restoration are to protect restored areas from erosion, reduce sediment delivery, restore soil hydrologic function, and reestablish a plant community with vegetation and cover comparable to the adjacent plant community.

Restoring OHV-damaged areas and closed OHV trails provides unique challenges not typically faced in other restoration projects. At OHV-disturbed sites, OHV traffic is the primary agent of disturbance. This means the treated site must be effectively closed to OHV traffic.

Although we may not always agree with their choices, OHVs are driven by thinking, decision-making, human beings. Where they decide to ride their OHVs can be strongly influenced by how a restoration project is implemented. The appearance of restoration or active management is often enough to keep traffic off restored areas or closed trails. Conversely, OHV damaged areas left untreated send the message that riding anywhere is acceptable.

OHV restoration projects cover a broad range of situations. They can be as simple as hand-raking duff and pine needles to obliterate OHV tracks, or as complex as reshaping the land surface with a large excavator or propagating and planting native plants. But whether the project is simple or complex, large or small, the same basic principles apply; it is just a matter of scale.

3 A Checklist for OHV Restoration

When planning and implementing a restoration project, few projects will require action under every one of the ten steps. However, each step should be considered to make sure the restoration process is complete. Taking a few minutes to inspect the site and think through the process before deciding which treatments to use will often make the difference between success and failure.

Each of the following ten steps deserves careful consideration. When applicable steps are ignored the risk of failure increases.

1. **Identify the Source of the Problem**
2. **Effectively Close the Area to OHV Traffic**
3. **Reshape the Land Surface to Its Original Contour**
4. **Disperse Concentrated Runoff**
5. **Prepare the Seedbed**
6. **Planting or Seeding**
7. **Stabilize the Surface**
8. **Signing**
9. **Enforcement and Monitoring**
10. **Remove Signs and Barriers**

4 Discussion

4.1 IDENTIFY THE SOURCE OF THE PROBLEM

Most OHV restoration projects fall into one of two categories: (1) designated trails that have been closed and rerouted, and (2) damage caused by unauthorized traffic, which may include user-defined trails. In the first case, the source of the problem is usually level of use, location, or some site factor such as steepness, slope length, entrenchment, or wetness. In the second case, OHV traffic is the problem.

An important part of the analysis is to determine why the OHV use is occurring where it is. Riders always have some reason for riding where they do. If the underlying reason for the OHV traffic is not dealt with or designed for, it will be difficult to keep OHV traffic off the restored area. If the reason for riding in the area is compelling enough, OHV riders will find a way to ride there again.

Some of the reasons for unauthorized OHV traffic are related to how the OHV area is managed. For example, trails blocked by logs or snowdrifts, lack of maintenance, poor trail location or alignment, dead end trails, and poor signing and maps, may cause riders to leave a trail. Some reasons for unauthorized traffic that are not related to management include cut-offs to connect to a known trail nearby, primitive camping, no place to ride legally, latchkey kids riding from home in the urban-interface, and just plain exploratory riding.

The point is that if the underlying cause of the OHV traffic is not recognized and dealt with, it may be impossible to keep traffic off the restored site. Identifying the underlying cause will also affect the type of barriers used and other measures taken to keep traffic off the restored site.

4.2 EFFECTIVELY CLOSE THE AREA TO OHV TRAFFIC

There are four basic strategies for keeping OHV traffic off a restored site: (1) make it invisible; (2) effectively barricade the site; (3) make it obvious that restoration is taking place; and (4) make the restored site impossible or highly undesirable to ride on.

Making the restored site invisible (Photo 1) is a long-term goal of OHV restoration; to have the site blend in with the surrounding vegetation. But this can take time; and it may not be possible on some sites.

Barriers come in many forms and vary in effectiveness. Photos 2 to 7 in the Appendix show a few that have been effective. Ultimately, the type of barrier selected will be based on cost vs. effectiveness, and on the materials that are locally available. Where archaeology sites are involved, it may be necessary to use techniques that minimize soil disturbance. The key is to provide a barrier sufficient to exclude the traffic, but no more than is necessary. This can range from low rails and soil berms to fences and large boulders. The effects that barriers have on safety and on visual appearance should also be considered in selecting a barrier type. Just about any barrier can be breached by a very determined user—and some will take it as a challenge—so dealing with the underlying cause is important.

Making the restoration obvious by creating the appearance that restoration is taking place is sometimes a sufficient deterrent to traffic. Spreading straw, or native plantings in seedling protection tubes, can send the message that restoration is taking place. Effective signs (see Step 6) are also part of this strategy.

Making the restored site undesirable to ride on by roughening the surface or by scattering slash and dropping logs is an effective deterrent (Photo 8). This strategy works well in forested and brushy areas. Even a small amount of material can be effective. Stopping and getting off an OHV to open a closed trail increases the potential to be caught, not to mention the amount of work involved and the loss of riding time.

Managing the flow of OHV traffic past a restored area is another strategy that can help keep traffic off restored sites. Modifying the trail alignment to increase the speed of traffic or to include challenging turns will decrease the chance riders will notice the restored site. Anything that keeps the rider focused on the trail instead of looking at the scenery going by will help.

Treating all of a closed trail visible from an authorized route is also important. If a portion of a closed and restored trail is still visible, riders will make an effort to get to it, especially if the a trail is one they remember riding in the past. Treating the visible portion with slash and downed logs is an effective deterrent.

4.3 RESHAPE THE LAND SURFACE TO ITS ORIGINAL CONTOUR

It is almost impossible to effectively drain deeply entrenched (3 to 4 feet or more) trails (Photo 9), and reshaping the land surface to the contour should be done where possible. Reshaping deeply entrenched trails requires large, heavy equipment, such as a large excavator or a mid-sized dozer (Photo 10). Using equipment that is too small is a common mistake when trying to reshape steep slopes. Only large equipment is stable enough and powerful enough to negotiate steep slopes safely. A large excavator also has a long reach to more effectively pull

in soil, slash, and large logs. Because large equipment is much faster than undersized equipment, it can also be more cost-effective. A skilled equipment operator and on-site supervision is essential on these projects.

If for some reason a large excavator cannot be used to reshape an entrenched trail back to the contour, or where there is no soil to pull in from the sides, the entrenched surface must be stabilized to protect it from concentrated water flow. Jute matting, well-anchored, is preferred over other products because it is tough and can be installed on uneven surfaces (Photo 11). Most other rolled blanket products require a smooth surface. If necessary, the matting can be augmented with straw wattles.

4.4 DISPERSE CONCENTRATED RUNOFF

Trails are linear features that tend to concentrate water, and the area or trail being restored must be protected from concentrated runoff. This is especially important where the treated site is deeply entrenched and has not been reshaped to the contour.

The source of concentrated runoff could be any upslope impervious surface such as a road, trail, old landing, staging area, or area of shallow, rocky soils. The source of concentrated flow could be hundreds of feet or more from the treated site, so some off-site investigation is necessary.

Failure to intercept and disperse concentrated runoff flowing onto a restoration site or trail is a common cause of failure. The treatment is to install a waterbreak that diverts flow away from the treated area.

If the trail being restored has been compacted, scarification or tillage may be needed. Tillage done up and down the slope can create subsurface slots that can lead to subsurface erosion by piping, especially if a rock ripper is used. Implements designed for tillage can sometimes also create subsurface slots.

4.5 PREPARE THE SEEDBED

Whether the site will be seeded, planted, or allowed to recover naturally, the need to prepare the seedbed should be assessed. The first step is to determine how much topsoil has been lost, and whether the soil is compacted. This can be done with a tile spade using an adjacent undisturbed soil as a reference.

If all of the topsoil has been lost, amendments may be needed. Amendments include fertilizer, compost, or topsoil “borrowed” from a nearby undisturbed site. If the soil is compacted, tillage or scarification may be needed. If the compacted soil is less than 3 or 4 inches deep, scarification with a harrow may be enough. If compaction is deeper, tillage may be necessary. An implement designed for tillage, such as a winged subsoiler or Forest Cultivator, is preferred over a rock ripper (which is designed to do just that—rip rocks, not to restore soil tilth). Compaction may not be deep in staging areas or broad areas of disturbance, but compaction is often deep on skid trails and old roadbeds.

On some Districts, “chunking” has been used effectively to restore OHV trails. Chunking is roughening the surface by working backwards up a trail with a small trail tractor, scooping and dumping small windrows of soil (Photo 12). This effectively closes the trail, restores

hydrologic function, avoids the need for drainage, and creates a rough surface with micro sites where native plants can become established. It works well where the plant community consists of annual grasses and shrubs. The annual grasses provide cover quickly. Over time, the roughened surface settles and local plants invade the site.

Where it can be done, pulling in native topsoil from nearby or adjacent to the treated area is very effective, especially in forested areas and in areas with shrubs and annual grasses. The soil is a source of local seeds, soil arthropods, microorganisms, mycorrhizzae, and stable organic matter.

The use of fertilizer is controversial, and it probably should not be used widely. But fertilization should not be dismissed, either, because it is a valuable tool. The main objection to fertilizer is that it encourages invaders and thereby suppresses the growth of native species. However, the purpose of OHV restoration is to protect the restored site from erosion and to reestablish vegetation similar to the adjacent plant community. That adjacent plant community may not be natives, or may not be adversely affected by fertilization.

Soil conditions and plant species will determine when fertilizer should be used as an amendment. Fertilizer should not be used in areas of sensitive plants. Sensitive plants often occupy harsh sites where competition is low, and fertilization can increase competition. For the same reason, fertilization should not be used where perennial native grasses are being encouraged.

Situations where fertilization could be considered are (1) broad areas where all the topsoil has been lost, (2) areas dominated by annual grasses, (3) forested situations where topsoil has been lost and the C:N ratio is wide because woody material has been added as mulch, and (5) when “bootstrapping” (see discussion that follows) to restore large disturbed sites.

If fertilizer is used, 16-20-0 S is the formulation of choice. The sulphur in this formulation is important in many California soils. Where there is concern about using fertilizer—such as near a watercourse—an organic or slow-release formulation can be used. In any case, fertilizer should be applied sparingly. The goal is to make the restored area as invisible as possible, and too much fertilizer could make the restored site greener and more lush than the surrounding area. Where used appropriately, a light fertilization will accelerate the establishment of vegetation and cover. The effects of fertilization will wear off in a year or so as nutrients are incorporated into the soil-plant system.

For the restoration of large areas, such as a staging areas and primitive campsites, “bootstrapping” is a good strategy. The concept is to heavily treat 10 to 15% of the area in small patches (30 to 100 square feet), and treat the remaining area less intensively. For example, 15% of the area may be treated with scarification or tillage, a mulch, some native soil “borrowed” from an adjacent undisturbed site, light fertilization, native plantings, and—if in a forested site—a few pieces of large woody material. The remaining 85% would be treated with scarification and a light mulch. The concept is to create small islands that will recover quickly and then serve as a seed source for filling in the remaining area. The islands serve as biological refuge sites for soil macro- and microorganisms and small animals. The visual and biological diversity created by this approach also allows the site to blend in to the surrounding landscape sooner.

Some plant species need to be scarified with fire for the seeds to germinate. Consult the local botanist for these special situations.

4.6 PLANTING OR SEEDING

When dealing with plant materials it is important to know the ecology of the plant species adjacent to the site being restored. Whether they are annuals, or perennials, whether the seeds are persistent in the soil, whether they require fire for scarification, whether they have rhizomes, whether they have mycorrhizal associations—all will affect how the restoration is designed.

Seeding is rarely used to restore OHV damaged sites because it is difficult to find an appropriate seed source. But there may be special situations where seeding should be considered as an option. For example, sterile wheat or barley might be used as temporary cover to quickly stabilize a small area where mulch is not practical or desirable. Another example would be a very large disturbed area where seed that matches the adjacent plant community is available. The goal is to restore the site so it blends in with the adjacent plant community and does not stand out.

Where it can be done, planting native shrubs or trees is a good option. Although labor-intensive, planting native seedlings can accelerate restoration. If volunteers are available, propagating and planting native species can be team-building and can create ownership in the management of the area. In addition, even the most hard-hearted rider would think twice before riding an OHV through an area full of native seedlings in seedling protector tubes (Photo 13).

Where OHV activity has rutted wet areas, meadows, and the margins of lakes, sod plugs "borrowed" from adjacent areas can be an effective restoration technique. Using sod plugs is also labor-intensive and suitable as a volunteer project.

4.7 STABILIZE THE SURFACE

Because seeding is rarely used, it can take time for the local vegetation to invade and stabilize a restored site. An exception is where annual grasses are used to provide cover, with or without a boost of fertilizer. Until vegetation becomes established, protective cover is needed to stabilize the surface and protect the soil from erosion. Where the restored sites are closed trails, cover can often be provided by raking in duff and litter, or a little surface soil from along the edge of the trail.

Larger disturbed areas, such as staging areas or primitive campsites, will usually need some type of mulch. If access is good, hydro-mulching is an option, as is a straw blower with a tackifier. Usually, lack of access precludes these options and material for mulching must be hauled in by hand or on an ATV.

This narrows the choices down to wheat straw, rice straw, or native grass hay, which is available from native seed growers. Getting a weed-free source is important. Wheat straw is most visible, which may be an advantage (Photo 14). Rice straw blends in a little better and may last a little longer. Native seed hay is expensive, but more likely to be weed-free. Native hay may also contain some native seeds, which may or may not be desirable, depending on

the situation. If a steep slope is involved, the mulch may be supplemented with straw wattles staked in across the slope.

Over application of mulch can suppress the establishment of vegetation and can decrease soil temperatures, altering soil biological and nutrient cycling processes. On some sites thick straw mulch and straw wattles can also increase rodent populations.

The high visibility of wheat straw may serve as a deterrent to traffic. Like native plantings, straw sends the message that restoration is in progress.

If all the other steps are followed, OHV-damaged areas do not usually require stabilization with rolled fiber products. An exception is deeply entrenched trails that cannot be reshaped to the contour. In this case, jute matting is the preferred option.

4.8 SIGNING

The signs I observed at restoration sites were inconsistent in shape, size, color, and wording. Many sent the wrong message. Brown carsonite stakes with a small yellow restoration sticker were commonly used at restoration sites. To a rider, a brown carsonite stake sends the message "trail", or "trail junction." This is not consistent with making restored trails invisible. If the rider does stop at the brown stake (to read the tiny restoration sticker) and sees a closed trail, the next thought might be "There was a trail here once; maybe if I get past this barrier I can find it."

Restoration signs should send the message to riders that staying off restored sites and closed trails protects and preserves the opportunity to practice their sport. Restoration signs should also be positive in tone, and direct riders to places they can ride.

Photo 15 shows a restoration sign that sends a positive message; the sign in Photo 16 is not positive, but a little in-your-face. Photo 17 shows a sign with an appropriate shape and color for restoration.

Ideally, signing for OHV areas and trails should be standardized and consistent, at least within a state. Unfortunately, OHV signs are not even consistent within NFs, let alone within the Region or between agencies. This serves no one well.

4.9 ENFORCEMENT AND MONITORING

Keeping traffic off restored sites and trails may require additional patrols and law enforcement. OHV users are understandably upset when trails they have used are closed. Maintaining an effective closure is most important during the first year or two while vegetation is becoming established and riders are changing their use patterns.

Monitoring is also needed to evaluate the effectiveness of restoration treatments. Drainage and erosion control measures need to be assessed and corrective action taken as needed; barriers and signs also need to be assessed and repaired or replaced as needed. Because of the many variables involved—especially the human ones—it may take several seasons to fully restore an area.

4.10 REMOVE SIGNS AND BARRIERS

Signs and barriers are not a natural part of the landscape. When the site blends in with the adjacent landscape, or when the trail is no longer rideable, signs and barriers become a liability and should be removed (Photo 18). Signs that are no longer needed draw attention to the location of former trails. Signs that are obviously no longer needed, that have fallen down or are shot full of holes, and barriers that have deteriorated, all send the message that management is lacking, and maybe even patrols. Signs no longer needed also draw attention to closed trails that riders perceive as lost riding opportunities.

5 Summary

The intent of this report was to describe the processes and general concepts to consider when designing and implementing OHV restoration. The ten-step checklist provides a basic framework for developing a more comprehensive handbook for the restoration of OHV areas.

A restoration handbook based on the material in this report could be expanded, and the material covered under each of the ten steps more fully developed. The material should also be peer-reviewed. Other specialists such as botanists, archaeologists, and wildlife biologists could make contributions. It might also be desirable to include sections on sources of funding, making cost estimates, the use of volunteers, and environmental analysis as they relate to OHV restoration projects.

If a handbook were formatted in a loose-leaf three ring binder, each section could also be a good place to keep information on suppliers of materials and equipment. Design specifications for specific treatments, such as specifications for types of barriers, could also be included.

Many of the OHV managers and their staff are doing a good job at restoring OHV-damaged areas. But there are others who lack the experience and are learning by trial and error. While some experimentation is good, there is merit in starting with the techniques that have worked well for others. There is far too much OHV restoration work to be done to have the luxury of learning by doing.

The information in this report—and an expanded version as a handbook—needs to get out to the people on the ground actually doing the restoration work. Whether or not a handbook is the best way to do this remains to be seen. Other means of providing information on OHV restoration include workshops, presentations at conferences, publication, videos, and one-on-one training conducted in the field.

6 Appendix

6.1 APPENDIX 1 PHOTOGRAPHS

Photo 1. Restored trail that is almost invisible

Photo 2. Large boulders used as barriers

Photo 3. Fence designed avoid soil disturbance in archaeology site

Photo 4. Welded steel fence made from oil well casings

Photo 5. Barriers constructed of railroad ties and installed with rebar

Photo 6. Fence constructed with peeler cores

Photo 7. Temporary fence of steel posts with PVC over wire

Photo 8. Closed trail treated with tillage, roughening, and slash

Photo 9. Deeply entrenched trail will require reshaping with an excavator

Photo 10. Deeply entrenched trail reshaped using an large excavator

Photo 11. Entrenched trail stabilized with jute, straw wattles, and slash

Photo 12. Closed trail freshly treated by chunking

Photo 13. Native plant seedlings in seedling protector tubes

Photo 14. Decommissioned road with light application of straw

Photo 15. Restoration sign with positive message

Photo 16. Restoration sign that could be more positive

Photo 17. Sign with appropriate size, shape, and color for restoration

Photo 18. Restored area with barriers and signs removed